

WIRED Series Superior Modular Philosophy

2kW to 80kW FM Transmitter Series

Standard and HOT PLUG-IN versions

Analog and Digital Ready for HD Radio and DRM

**Based on VL Series High Efficiency
LDMOS Amplifiers 1,1kW or 2,2kW**

Hot Plug-in Power Supply

Up to 75% Overall Efficiency

**PLANAR LDMOS
65:1 VSWR Tollerant**

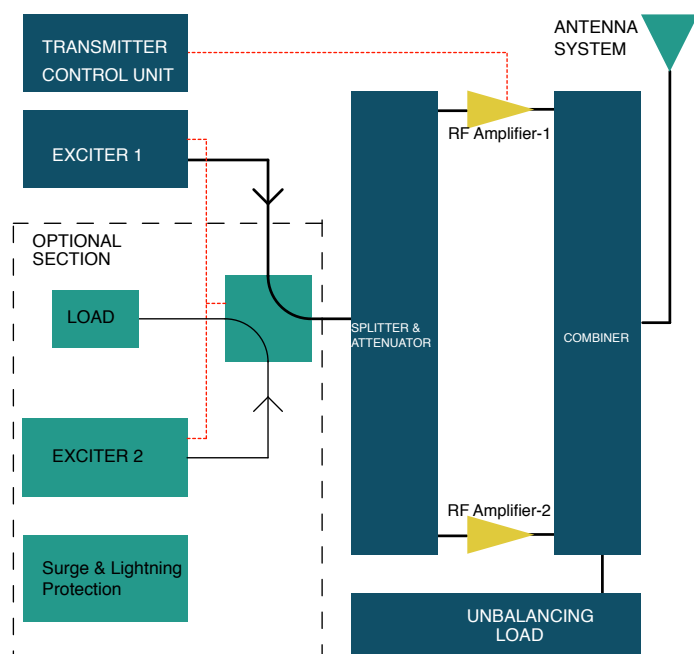
**Fully RF and Power
Supply
Redundant**



CTE
Digital Broadcast

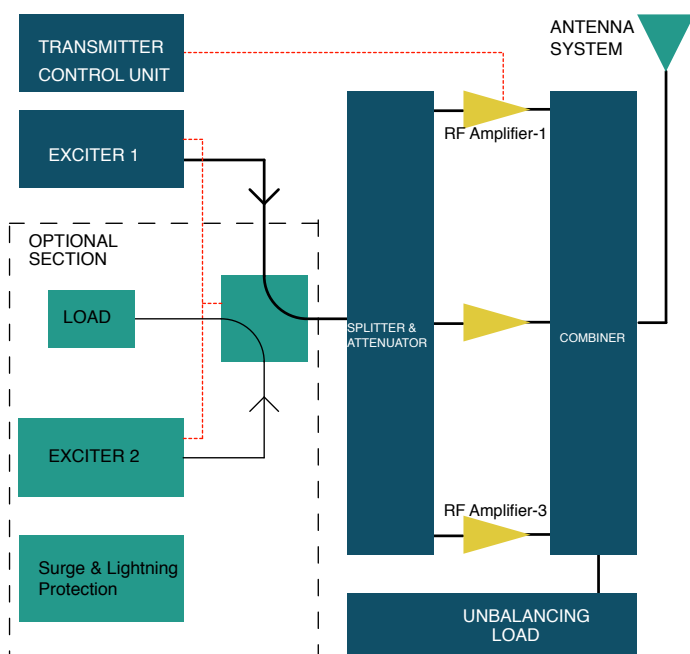
TXM 4/3

4kW SMP Technology, Superior Modular Philosophy



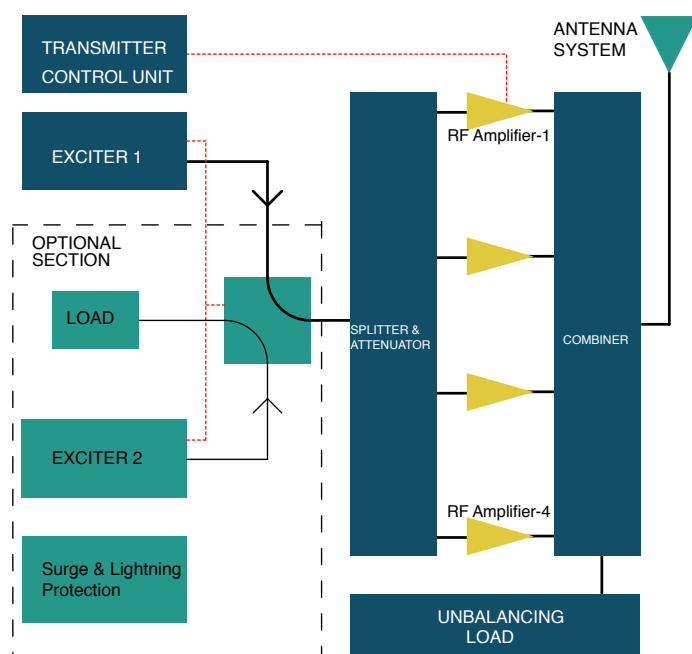
TXM 6/3

6kW SMP Technology, Superior Modular Philosophy



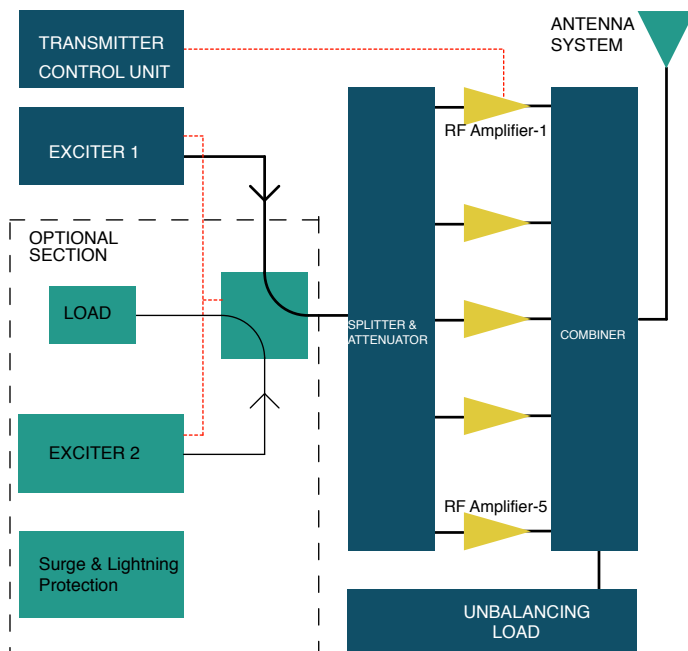
TXM 8/4

8kW SMP Technology, Superior Modular Philosophy



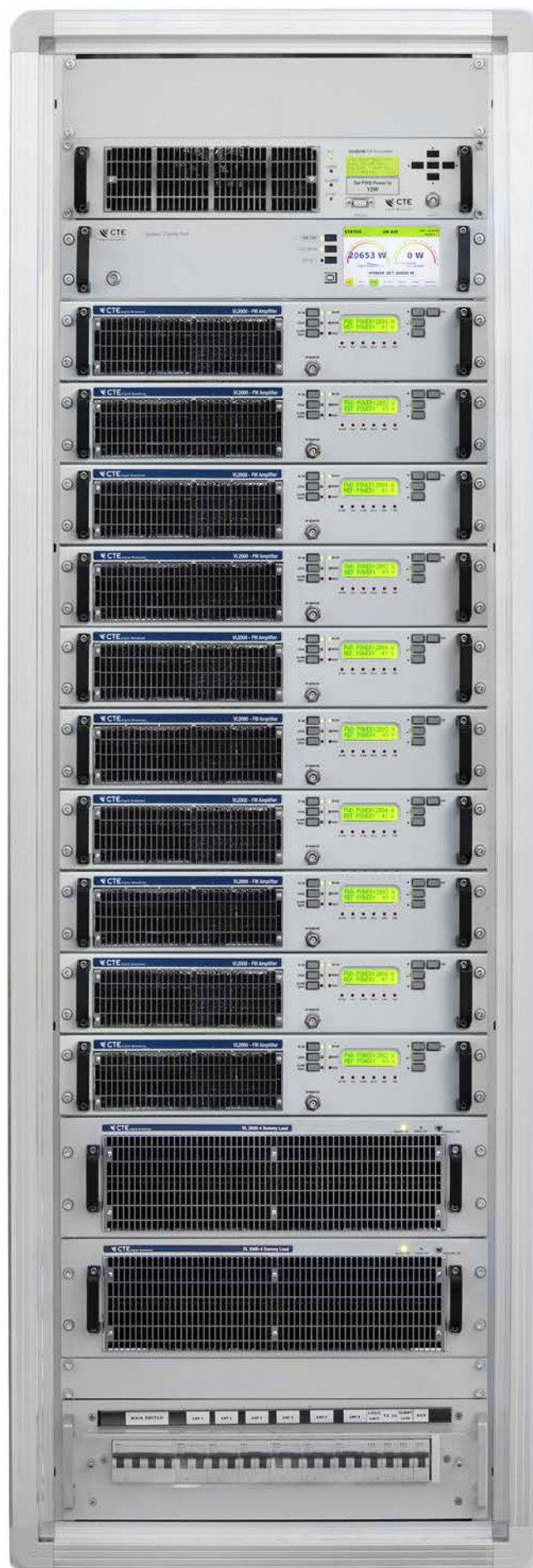
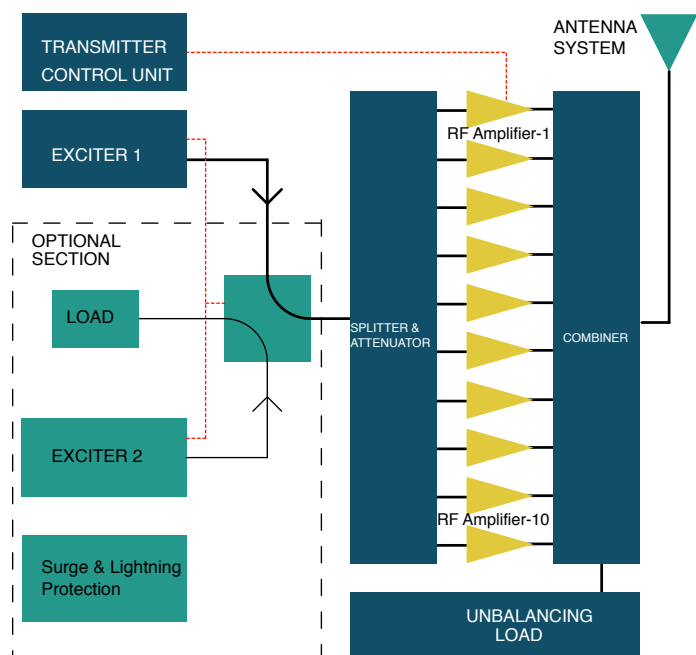
TXM 10/5

10kW SMP Technology, Superior Modular Philosophy



TXM 20/10

20kW SMP Technology, Superior Modular Philosophy



HOT PLUG-IN POWER SUPPLY

Replace the power supply in 2 minutes

Remove the front pannel, operating only
fourscrews



Pull Off the sliding power supply



REVOLUTIONARY MODULAR COMBINER BROKEN THE PORT NUMBER LIMITS.

- Ultra Compact Design.
- Low power to high power direct stepping.
- Low loss.
- Non Hierarchy Arbitrary odd and even port number.
- Ground referred balancing loads.
- Extremely high isolation value: more than 26dB.
- Up to 10 input way for 20 kW Output Power.
- Ultra-wideband, exceeds more stringent specifications.
- Phase stable.
- Best in class low loss performance: less than 0.1dB
- More than 12 dB of additive harmonic filtering.
- Low Cost vs Power ratio.

The Combining system is composed by the COMBINER itself, the ISOLATED SPLITTER 2-10 way and the UNBALANCED POWER LOAD 2-10 way

TXM SMP Superior Modular Philosophy

When developing SMP Technology, Superior Modular Philosophy, the main target was: Always on Air, Less than 15 kg (35 lbs) of modules-weight, Easy maintenance, Low consumption and High Efficiency

The only way to reach this goal consists in the creation of a modular structure where each block of the system has been obsessively optimized for best results.

When each Brick is perfectly realized the overall structure benefits of this optimization obtaining the a global high optimization of the Transmitter.

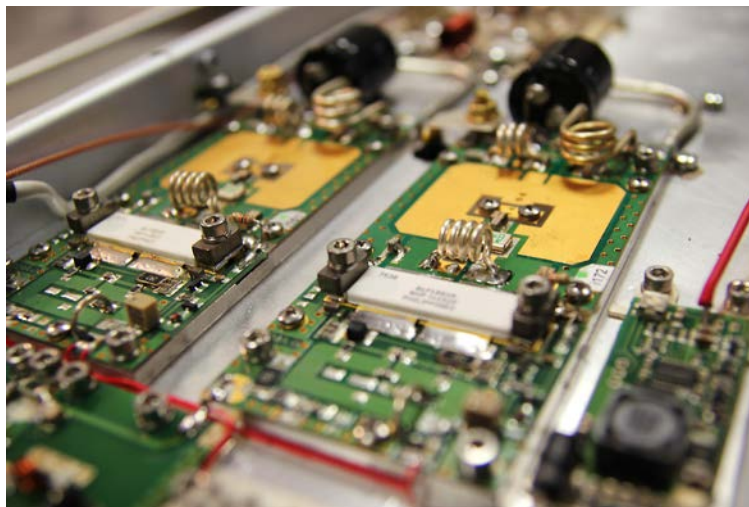
Superior Modular Philosophy, means create big broadcast systems made by small highly optimized bricks. The Bricks are the small VL Series Amplifiers.

Superior Modular Philosophy is the synthesis of extreme reliability and flexibility.



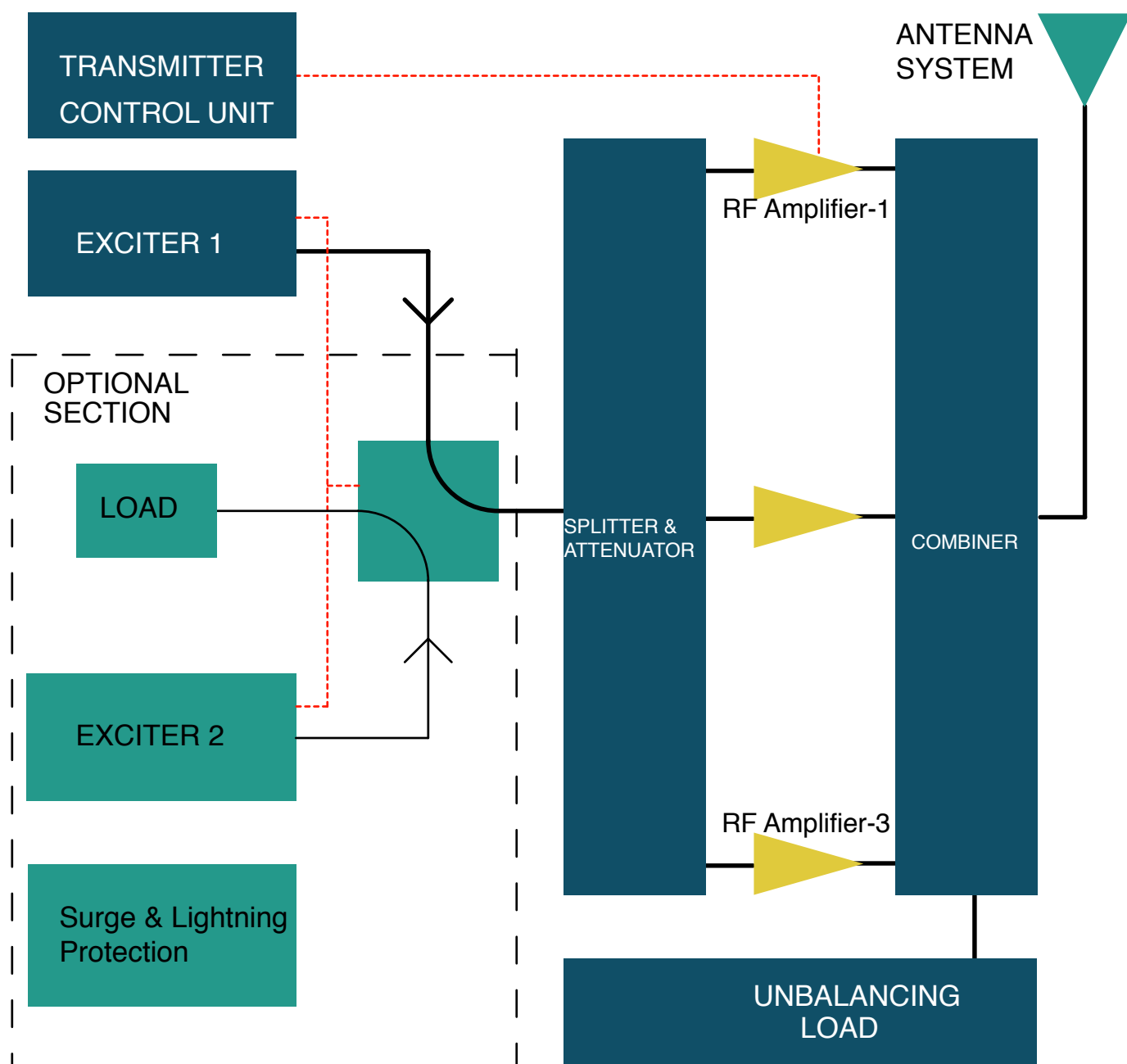
FULLY REDUNDANT RF AMPLIFIER IN PLANAR TECHNOLOGY

2 x 1.5kW power amplifier modules on VL2200 or 2 x 700W on VL1200



TXM 4kW to 20kW Block Diagram

The number of RF Amplifiers changes with the output power (see table)



VL1000 / VL2000 FM Amplifier

1kW and 2kW Analog and Digital Ready FM Amplifiers
HD Radio and DRM compatibility
Up to 75% Overall Efficiency
PLANAR LDMOS
65:1 VSWR Tollerant
Fully RF and Power Supply Redundant

Output power 1000W or 2000W using High Efficiency last LDMOS technology is housed into an ultra-compact cabinet of only 2U height.

For any application VL1000 and VL2000 is the ultimate solution that meets most demanding customer' requirements and guarantees professional features at affordable price.

- High Efficiency last generation LDMOS technology up to 80%
- TOTAL SPECTRAL PURITY: > -100 DBC SPURIOUS, > - 84 DBC HARMONICS
- FULL- RANGE POWER SUPPLY: 90-260 VAC MAINS VOLTAGE
- UP TO 75% LDMOS HIGH EFFICIENCY AMPLIFIERS
- HIGHEST RF SIGNAL QUALITY
- REMOTE CONTROL BY TCP/IP: WEB + SNMP OF ALL SIGNAL PARAMETERS



Fully WEB Based controls and remote all the transmitter's parameters



Wi-Fi Remote Control with any Tablet or Smart Phone.

Works with any Browser, runs under any operating system, IOS, Android, Windows, OSX and in any kind of devices PC, Tablet or Smartphone.

Thanks to the WCU it's possible to see all the trasnmitter parameter and the ones related to the amplifiers modules and fully control the transmitter.

List of parameters that can be read:

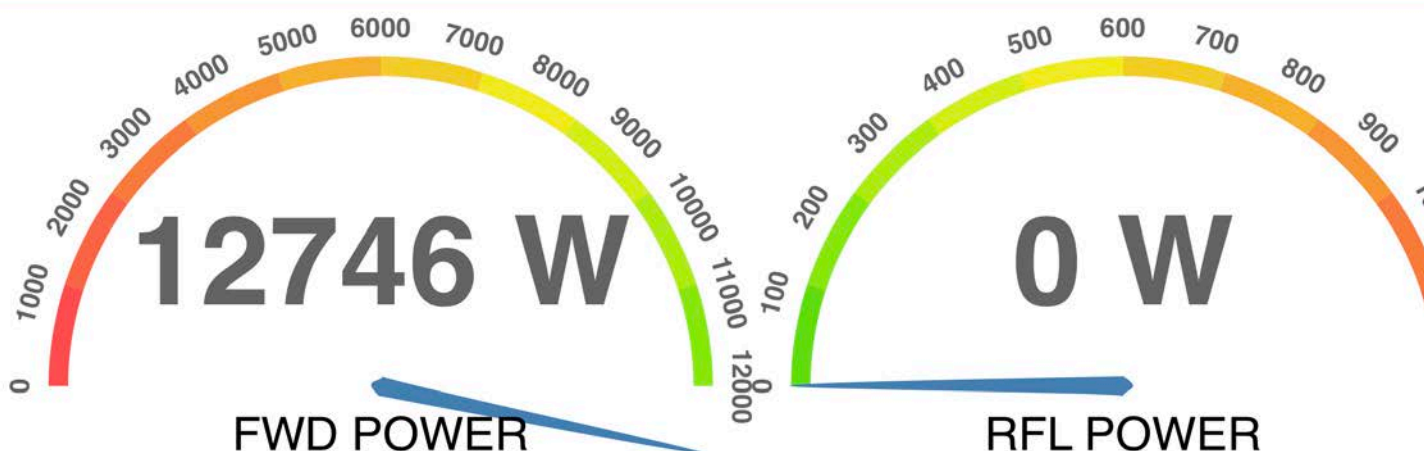


STATUS

ON AIR

TIME: 14:20:38

LOCAL



POWER SET 12500 W

RF ON

RF OFF

RESET

MENU

MODULES

MODULE 1



RF ON

ON AIR

INTERLOCK

LOCAL

CONNECTED

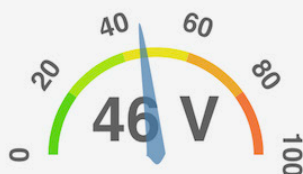
-3dB

ALARM

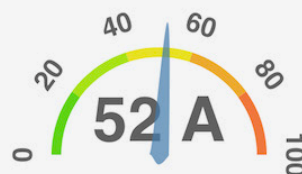
FAULT

VSWR

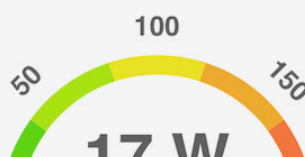
RESET



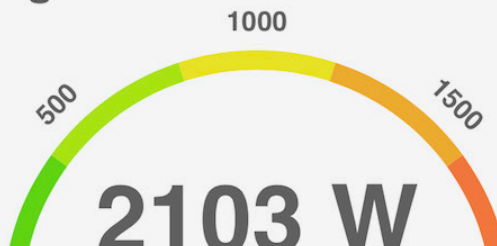
VPA



IPA



17 W




























2103 W



43 °C



POWER SET: 12500 W FWD: 12700 W RFL: 0 W										
	CONN	ON AIR	LOCAL	FAULT	FWD	RFL	IPA	VPA	TEMP	
MOD					2084 W	43 W	57 A	44 V	54 °C	
MOD					2083 W	49 W	58 A	43 V	54 °C	
MOD					2085 W	55 W	55 A	43 V	51 °C	
MOD					2084 W	40 W	54 A	47 V	59 °C	
MOD					2084 W	33 W	50 A	48 V	49 °C	
MOD					2086 W	36 W	55 A	43 V	51 °C	

TXM with Analog Exciters Models

Model	Description
4kW/2	4000W modular high efficiency, Redundant Active Reserve, FM Transmitter composed byTX50-BS Exciter, Nr.2 VL2000 Amplifier
6kW/3	6000W modular high efficiency, Redundant Active Reserve, FM Transmitter composed byTX50-BS Exciter, Nr.3 VL2000 Amplifier
8kW/4	8000W modular high efficiency, Redundant Active Reserve, FM Transmitter composed byTX50-BS Exciter, Nr.4 VL2000 Amplifier
10kW/5	10000W modular high efficiency, Redundant Active Reserve, FM Transmitter composed byTX50-BS Exciter, Nr.5 VL2000 Amplifier
12kW/6	12000W modular high efficiency, Redundant Active Reserve, FM Transmitter composed byTX50-BS Exciter, Nr.6 VL2000 Amplifier
14kW/7	14000W modular high efficiency, Redundant Active Reserve, FM Transmitter composed byTX50-BS Exciter, Nr.7 VL2000 Amplifier
16kW/8	16000W modular high efficiency, Redundant Active Reserve, FM Transmitter composed byTX50-BS Exciter, Nr.8 VL2000 Amplifier
20kW/10	20000W modular high efficiency, Redundant Active Reserve, FM Transmitter composed byTX50-BS Exciter, Nr.10 VL2000 Amplifier
24kW/12	24000W modular high efficiency, Redundant Active Reserve, FM Transmitter composed byTX50-BS Exciter, Nr.12 VL2000 Amplifier
32kW/16	32000W modular high efficiency, Redundant Active Reserve, FM Transmitter composed byTX50-BS Exciter, Nr.16 VL2000 Amplifier
40kW/20	40000W modular high efficiency, Redundant Active Reserve, FM Transmitter composed byTX50-BS Exciter, Nr.20 VL2000 Amplifier
80kW/40	80000W modular high efficiency, Redundant Active Reserve, FM Transmitter composed byTX50-BS Exciter, Nr.40 VL2000 Amplifier

Model	POWER			OUTPUT CONNECTOR (Inch EIA Standard)	DIMENSIONS (19")
TXM 1k/1	1kW	1	1350VA	7/16	1U Driver + 2U Amplifier
TXM 2k/1	2kW	1	2700VA	7/16	1U Driver + 2U Amplifier
TXM 4k/2	4kW	2	5400VA	7/8	Rack 20U
TXM 6k/3	6kW	3	8100VA	7/8	Rack 32U
TXM 8k/4	8kW	4	10800VA	1 5/8	Rack 32U
TXM 10k/5	10kW	5	13500VA	1 5/8	Rack 32U
TXM 12k/6	12kW	6	16200VA	1 5/8	Rack 32U
TXM 14k/7	14kW	7	18900VA	3 1/8	Rack 40U
TXM 16k/8	16kW	8	21600VA	3 1/8	Rack 40U
TXM 20k/10	20kW	10	27000VA	3 1/8	Rack 40U
TXM 24k/12	24kW	12	32400VA	3 1/8	Rack 40U
TXM 32k/16	32kW	16	43200VA	4'	2 x Rack 40U
TXM 40k/20	40kW	20	54100VA	4'	2 x Rack 40U
TXM 48k/24	48kW	24	64900VA	4'	2 x Rack 40U
TXM 96k/48	96kW	48	130000VA	6'	4 x Rack 40U

TX-DDS Series OPTION

DDS Direct to Channel Digital FM Modulator

30-50-100-150-300-600-1200W



TX-DDS Exciter/Transmitter is a Family of DDS Direct to Channel Digital FM stereo Exciters/Transmitters that guarantees a superior transmission quality and top performances. Output power from 30 W to 1200W using High Efficiency last LDMOS technology is housed into an ultra-compact cabinet of only 2U height.

TX-HE is available also in JPN and OIRT frequencies.

TX-HE can be used as ultra-compact stand alone station, as well as driver in complex high power transmitters and N+1 systems.

For any application TX-DDS is the ultimate solution that meets most demanding customer' requirements and guarantees professional features at affordable price.

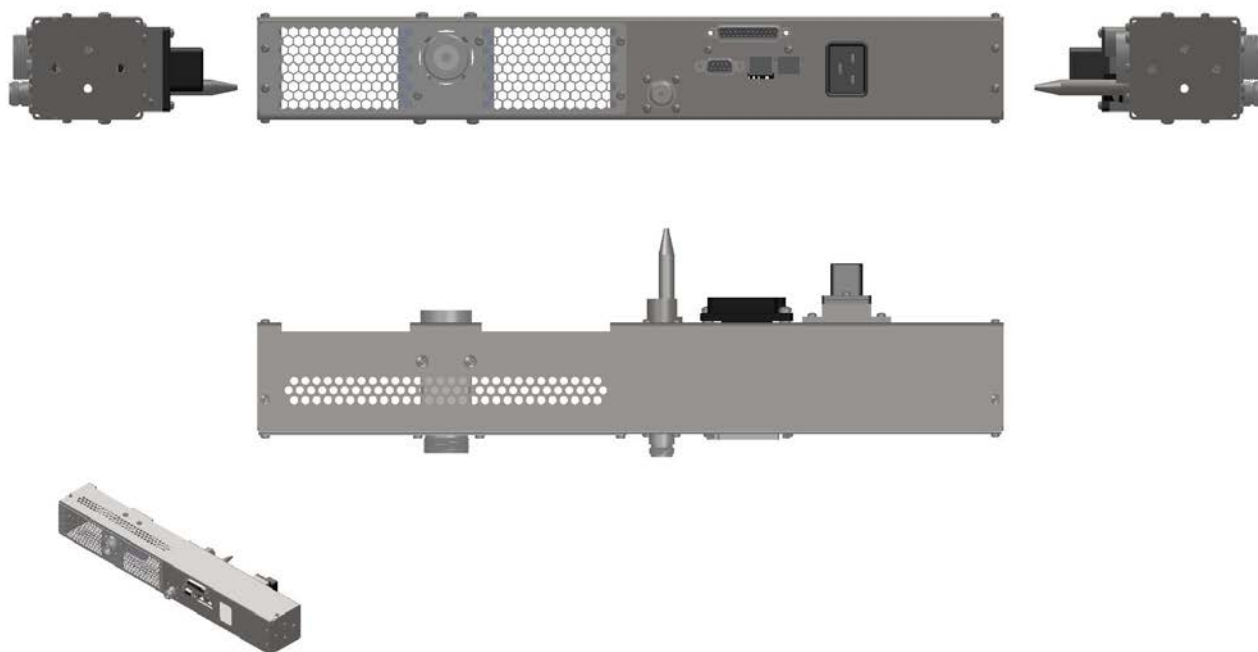
- High Efficiency last generation LDMOS technology up to 80%
- Very LOW SIGNAL TO NOISE MORE THAN 90 DB v
- Very LOW DISTORTION and HIGH STEREO SEPARATION
- TOTAL SPECTRAL PURITY: > -100 DBC SPURIOUS, > - 84 DBC HARMONICS
- SEVEN SELECTABLE COMPLETE SET-UP: READY FOR USE IN 7+1 SYSTEM
- FULL- RANGE POWER SUPPLY: 90-260 VAC MAINS VOLTAGE
- COMPLIANT WITH ALL THE STANDARD: ETSI – CCIR - FCC.
- DIGITAL STEREO CODER: SUPERIOR STEREO QUALITY
- UP TO 75% LDMOS HIGH EFFICIENCY AMPLIFIERS
- EXTERNAL 10MHz and 1PPS SYNCHRONIZATION FOR USE ON SFN APPLICATIONS
- HIGHEST RF SIGNAL QUALITY
- PERFECT AUDIO FIDELITY
- REMOTE CONTROL BY TCP/IP: WEB + SNMP OF ALL SIGNAL PARAMETERS
- CLEAR CRISTAL AUDIO SOUND
- DYNAMIC RDS ENCODER with TMC Function
- FULL UECP Protocol to control remotely all functions of the RDS
- SFN-Single Frequency Networks
- ASC-Automatic Audio Source Changer

TXM HOT PLUG-IN Option

With this option it is possible to connect and disconnect the amplifier modules from the front of the rack without the need to open the rear door or other types of intervention inside the rack.

All operations can be carried out with the transmitter in the air and without service interruptions





OVERALL CHARACTERISTICS

TXM SMP® Superior Modular Philosophy allows relevant advantages:

- The entire system benefit of the optimum characteristics of the base module VL Amplifier.
- The VL Amplifier are each of them a complete a functioning module with it's own power supply ventilation, control logic and output filter, so, as the opposite of the standard plug-in transmitters bricks live by themselves with facilities the maintenance and the test: no need of special tools, each module can be connected and installed or tested as a single amplifier.
- Developing the VL Amplifier our engineers concentrate all the effort on: minimize weight, cost, power consumption and heat produced, and maximize: efficiency, reliability, electrical performance, connectivity and easy maintenance.
- A single VL Amplifier can be put on air as back-up of a bigger transmitter.
- Shock and vibration during the transportation process can compromise the result of an installation, optimizing the VL Amplifier package allow our engineers to meet the most demanding transport conditions for hermetic, temperature control and vibration and Shock Isolation.
- During installation and maintenance, handled light packs help the health to operators.

The **TXM SMP® Superior Modular Philosophy** is a family based on a very compact Amplifier and its various combinations. Thanks to a careful choice of size, 2 HE, power levels of the building blocks 2 kW FM, it can be considered as the New Reference for the modular transmitters.

The modularity is completed with special combiners, FM exciters and control logics.

FM exciter can be Analog or DDS both with integrated AES/EBU interface.

KEY FACTS

Combining System

- Compact and well isolated up to twelve way 20 kW PC Power Combiner, ultra-broadband, phase stable, low loss and showing more than 20 dB of additive harmonic filtering.
- Soft controlled sequential start-up reduce inrush current during OFF to ON transition.
- FM transmitters featuring only 800 mm rack depth and up to 40 kW FM in a single 19" rack.
- Digital TV Transmitters up to 8 KW Wide Band Doherty (WBD) output power in a single 19" rack.

Hardware and Software Protections

- Over and Under Voltage DC, Over and Under Voltage AC, RF and Power Supply Temperature, RF Coaxial Output Open or Short Circuit
- Capability of a long working time on Short/Open loads at all

phase angles without any damage.

- Last generation 1400 W LDMOS, VSWR > 65:1 @ all Phase Angles, designed for enhanced ruggedness ISM applications and plasma generators.

- Integrated AC Mains filtering.
- Integrated lightning protection.
- Delayed energized of the system after Mains Power Blackout prevents against peaks and high variation voltages typical of this events.
- Soft controlled sequential start-up so to reduce the Inrush current during OFF to ON transition.

WEB/SNMP Telemetry and Remote Control

- Full Local or Remote control by by logon username and password.
- Remote control with Smartphones or Tablet.
- Host Logic and tele-measurement (TM, TC & TA).
- Remote control and monitoring via SNMP and/or WEB interface.
- With logbook or log file to record error or alarm message.
- Display of forward/reflection power value and reflection high alarm.

Human Interface

- Each module is equipped with a logic controller that allows full control by a local operator.
- All transmitter and amplifier parameters required for diagnostics can be retrieved locally or remotely via standard (IP) protocol and standard software (web browser, SNMP).
- Multilingual user guidance.
- High Definition, high contrast Color Oled display.
- Quick set of thresholds for protections level. This set is based on assignment of three "flavors" or PERSONALITIES: Conservative (primary target = protect itself), Standard (balanced), Aggressive (primary target = transmission without interruptions).

N+1 and Backups systems

- Conventional standby systems such as: exciter standby, (n+1) Transmitter standby, passive standby and active output stage standby can be implemented.
- No additional control units are needed for the exciter standby and the active amplifier standby.

LD Tech HIGH Efficiency

- Very high efficiency (more than 75% for a complete 5 kW amplifier).
- Last LDMOS technology for power modules.
- Ultra High RF efficiency (>80 % typ.) software optimized for each power level.
- Lowest weight and dimensions in the industry.
- Lower device heating.
- Lower room heating.
- Lower space occupied.
- Lower maintenance needed.
- Small dimensions and low weight, reduce transportation costs and simplifying the logistic.
- Longer Component Lifespan.
- Reduced Electricity Costs.
- Lower Maintenance Costs.
- Reduced Cooling Costs.
- Fewer Fans.

Driver included on the VL Amplifier

- Maximum redundancy with virtual bottleneck elimination due to presence of a driver stage (LDMOS) on each plug.
- Low power exciter due to presence of a driver stage (LDMOS) on each plug.
- Low power splitters.
- No PA changeover required.

Power Supply Redundancy

- Maximum redundancy due to presence of a compact reliable power supply on each plug
- Highest reliability supply configuration.
- The SMP Module includes a very efficient AC-DC (typ > 95%) SMPS (Switch Mode Power Supply).

Electrical Characteristics

- Very high harmonics suppression (-90dB).
- Independent, individual APC (Automatic Power Control) circuit maintain a constant output power set.
- Frequency-response-compensated directional couplers and precision internal indicators.
- Distributed less binding Low Pass filter.

Maintenance Facility

- Power Unit and Amplifier Hot swapping: plugs can be extracted/inserted without switch-off the equipment.
- Zero-Current and Zero-RF Plug-in insertion/extraction system.
- Universal spare parts: each plug is phase and amplitude characterized.
- Worldwide available spare part for power Supply (GE-General Electric).
- Any VL amplifier can be interchanged with any other in the same TXM transmitter or with a spare. No adjustment or program of any kind are needed.
- Smart Air filter included easy to clean or replace.
- Zero-Current and Zero-RF Plug-in insertion/extraction system.
- 90% of spare parts shared between FM transmitters.
- Optimized Air Flow Paths avoid damages on the electronic boards.
- The path of the air inside the transmitter to avoid contact with the electronic boards.
- Tropicalization of all the components against dust, humidity and pollution.
- Exhaustive final quality test.

TECHNICAL CHARACTERISTICS

Transmitter

Power Output: Adjustable from 2kW to 40kW build with 2kW Amplifier Module up to 10 Modules in one Rack:
2kW = 1 Module, 4kW = 2 Modules, 6kW 3 Modules, 8kW 4 Modules, 10 kW 5 Modules, 12 kW = 6 Modules, 16 kW 8 Modules, 20kW 10 Modules

Power higher than 20kW are build combining more racks amplifiers:
24kW = 2 Racks 6 Modules each rack, 32kW = 2 Racks 8 Modules, 40kW = 2 Racks 10 Modules.

Output power on/off and adjustable from front panel and remotely.
Overall Efficiency (Typical): $\geq 75\%$ for transmitter.
RF Output Impedance: 50 ohm.
RF Output Connector: 1+5/8 and 3+1/8 type. (other on request)
Monitor RF: -57 dBc, BNC connector
VSWR: 1.5:1 Maximum with automatic fold-back at higher VSWR

Exciter 30W to 1200W Analog HE and Digital DDS Series

Frequency Range: 87.5 ÷ 108.00 MHz, Programmable in 10 KHz steps
On request 66 ÷ 74 MHz (OIRT), 76 ÷ 90 MHz (JPN) Bands.
Frequency Stability: better than ± 150 Hz from -10 to +50°C
Max deviation: ± 150 kHz.
Reference: TCXO 12.8 MHz. Can be synchronized by 1-2-2.5-5-10 MHz self select external clock (optional).
Frequency Control: Synthesizer μ processor control.
Exciter Power Output: 50 W
Output Impedance: 50 ohm.
Display: forward/reflection power and modulation indicator
Type of Modulation: Direct frequency modulation of carrier frequency, F3E Stereo with Subcarrier and Mono .
Lock in Time: Typ. 4 second.
Off Lock Attenuation: ≥ -80 dBc.
Modulation Capability: ± 150 KHz.
Modulation Mode: Mono, Stereo, Multiplex, SCA, RDS, Aux.
Preemphasis: Flat(0)/50/75 μ s selectable from front panel.
Asynchronous AM S/N Ratio: -60 dB below reference carrier with 100% AM modulation @ 400 Hz, without FM modulation.
Synchronous AM S/N Ratio: -60 dB below reference carrier with 100% AM modulation @ 400 Hz with FM modulation ± 75 KHz @ 400 Hz.
RF Harmonics: Exceeds ETSI/EBU/CCIR/FCC requirements. better than 84 dbc
RF Spurious: Exceeds ETSI/EBU/CCIR/FCC requirements. better than 84 dbc
Output Connectors: 30W to 600W N type connector, 1200W DIN 7/16 type connector

MONAURAL OPERATION

Audio Input Impedance: 600 ohm balanced, 15 Kohms unbalanced.
Audio Input Level: -12 to +12 dBm. (Other range on request)
Input Connector: XLR female.
Audio Frequency Response: ± 0.15 dB, 30 Hz to 15 KHz.
Total Harmonic Distortion + Noise: 0.03% @ 400 Hz
Intermodulation Distortion: 0.03%, 1 KHz/1.3 KHz, 1:1 ratio
Transient Intermodulation Distortion: 0.03%, 2.96KHz square wave and 14 KHz sine wave.
FM S/N Ratio: -89 dB RMS detector, -85 dB below ± 75 KHz deviation, 50 μ s de-emphasis, weighted.

MULTIPLEX OPERATION

Composite Input Impedance: 5 Kohm unbalanced.
Composite Input Level: 3.5Vp-p for ± 75 KHz deviation.
Input Connector: BNC female.
Composite Amplitude Response: $\leq \pm 0.1$ dB, from 30Hz to 53kHz
Total Harmonic Distortion + Noise: 0.03% @ 400 Hz
Intermodulation Distortion: 0.03%, 1 KHz/1.3 KHz, 1:1 ratio
Transient Intermodulation Distortion: 0.03%, 2.96 KHz square wave and 14 KHz sine wave.
FM S/N Ratio: -89 dB RMS detector, -85 dB below ± 75 KHz deviation, 50 μ s de-emphasis, weighted.

STEREO OPERATION

Audio Input Impedance: 600 ohm balanced, 15 Kohm unbalanced.
Audio Input Level: -12 to +12 dBm.
Input Connector: XLR female.

Audio Frequency Response: ± 0.15 dB from 30 Hz to 15 KHz.
Total Harmonic Distortion + Noise: 0.03% @ 400 Hz
Intermodulation Distortion: 0.02%, 60Hz /7kHz 4:1 ratio +4dBu
Transient Intermodulation Distortion: 0.03%, 2.96 KHz square wave and 14 KHz sine wave.
FM S/N Ratio: -85 dB RMS detector, -82 dB below ± 75 KHz deviation, 50 μ s de-emphasis, weighted.
Stereo Separation: 30÷80 Hz ≥ -53 dB, 80Hz÷15 KHz ≥ -65 dB (Typ. 70 dB).

Crosstalk attenuation: Main to Sub -55 dB 30 Hz to 15 KHz
38 KHz Suppression: ≥ -70 dB (typ. -85 dB).
Pilot Frequency: 19 KHz ± 1 Hz
Phase Pilot: $\pm 2^\circ$ adjustable
Output Pilot: 1 Vpp., BNC female
Audio Filter Attenuation: ≥ -55 dB @ 19 KHz, > -45 dB 20 KHz to 100 KHz.
Modes: Stereo, Mono L+R, Mono L, Mono R.

AES/EBU OPERATION

Input Level: -10dBfs to 0dBfs
Input Connector: XLR female, optical TOS-LINK.
Input Impedance: 110 ohm.
Data Format: S/PDF, AES/EBU, IEC958, EIAJCP340/1201.
D/A Converter: 24 bit.
Sampling Frequency: from 32 to 96 KHz with automatic selection
Stereo separation (crosstalk): ≥ 50 dB, 100Hz to 5kHz
Amplitude response: $\leq \pm 0.1$ dB, from 30Hz to 15kHz
FM S/N Ratio: -85 dB below ± 75 KHz deviation, 50 μ s de-emphasis, weighted.

SCA, RDS, AUX OPERATION

Input Connector: BNC female
Input Impedance: 3 Kohm.
Input Level: -3 to +6 dBm.
Frequency Response: ± 0.2 dB, 40 KHz to 100 KHz.
Input Connector: BNC female. Most SCA, RDS, AUX, performance parameters are determined primarily by the generator used.

AUXILIARY CONNECTIONS

USB: connector Type B female front panel.
N°2 RS485: Serial Interface connector RJ45 back panel.
Telemetry Interface: connector DB25F back panel.
External Clock: connector SMA female (optional).

OPTIONS

External clock: for PLL synchronization purpose 1-2-2.5-5-10 MHz external reference oscillator with self selection of the incoming frequency.

- DOUBLE EXCITER WITH AUTOMATIC CHANGEOVER SYSTEM
- SNMP TELEMETRY INTERFACE
- GSM AND PSTN TELEMETRY
- TCP/IP TELEMETRY INTERFACE
- SINCH-MODULE FOR SFN APPLICATION
- OIRT & JPN VERSION
- DIGITAL AUDIO INPUTS
- LPFM CODE STATION: FCC IDENTIFICATION CODE
- RDS CODER : EASY PROGRAMMABLE BY PC
- SCA Encoder
- Digital Composite 192kHz Input

ELECTRICAL (for 10kW to 40kW Transmitter)

AC Input Power: 230/400 VAC $\pm 15\%$, 50/60 HZ (± 3 Hz) single phase or 3-phase+N
Power factor > 0.98
Cooling: Forced air
MTBF > 20.000 Hours

ENVIRONMENTAL

Operating temperature: -10°C to +50°C.
Max Operating Altitude: 4000 mt.
Relative Humidity Range: 0 to 95% non condensing.
Protection against Lightening, Dust and Corrosion

PHYSICAL DIMENSIONS (For typical 10kW Transmitter): Mounting: 40 unit cabinet (Other size Rack on request)
Size: 570mm. (W) x 1000mm. (D) x 1800 mm. (H) - Weight: ~ 220 Kg



CTE Digital Broadcast

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